The chemical effects of ultrasound are diverse and include dramatic improvements in both stoichiometric and catalytic reactions. In some cases, ultrasonic irradiation can increase reactivities by nearly a million-fold. It does so through the process of acoustic cavitation; the formation, growth and implosive collapse of bubbles in a liquid.

During cavitational collapse, intense heating of the bubbles occurs. The localized hot spots have temperatures in the range of 5000°C, pressures approaching 500 atmospheres, lifetimes of a few microseconds, and heating and cooling rates greater than 109 K/s.*

Applications for chemical reactions exist in both homogeneous liquids and in liquid-solid systems. Of special synthetic use is the ability of ultrasound to create clean, highly reactive surfaces on metals. Ultrasound has also been found to be beneficial for the initiation or enhancement of catalytic reactions, in both homogeneous and heterogeneous cases.

RECOMMENDED ULTRASONIC PROCESSOR

VC 505, VC 750, VCX 500, or VCX 750. Please see pages 7 and 9 for detailed description.

SONOCHEMICAL REACTION VESSELS

The Suslick reaction vessel consists of a glass chamber and a stainless steel collar. Three side ports accept septum for syringe charging or retrieval. The collar screws onto a standard solid ½" (13 mm) probe Part No. 630-0227 at the nodal point. The glass chamber slides into the collar and is held in place by an internal O-ring. With the other reaction vessels, the adapter Part No. 830-00014 is screwed onto the special probe Part No. 630-0217 at the nodal point. The glass chamber slides onto the adapter and is secured in place as the bushing is screwed into the chamber compressing the O-ring. Moving the glass chamber up or down on the adapter allows the portion of the probe protruding out of the adapter to be immersed at the optimum depth into the sample.

4-10 ml Suslick reaction vessel. Glass chamber height: 3¼" (82 mm). Part No. 830-00007. Used with ½" (13 mm) probe. Part No. 630-0227.

4-10 ml reaction vessel.** Two 14/20 side necks. Supplied with bushing and O-ring. Glass chamber height: 4⅞" (123 mm). Part No. 830-00011.

10-50 ml reaction vessel.** Bottom well capacity: 10 ml. Main body capacity: 50 ml. Two 14/20 side necks. Supplied with bushing and O-ring. Glass chamber height: 4¾" (120 mm). Part No. 830-00012.

40-250 ml reaction vessel.** Three 14/20 side necks. Supplied with bushing and O-ring. Glass chamber height: 6⅜" (162 mm). Part No. 830-00013.

SPECIAL PROBE

½" (13 mm) special 10" (254 mm) long full wave solid probe. Used with the adapter below. Titanium alloy Ti-Al-4V. Autoclavable Part No. 630-0217.

ADAPTER

5" (127 mm long). Stainless steel. Internally threaded. Screws onto a full wave 10" (254 mm) long ½" (13 mm) probe at the nodal point. Part No. 830-00014.

* From an article by Dr. Kenneth Suslick, Professor of Chemistry and Beckman Institute Professor, University of Illinois Urbana/Champaign.

** Must be used with the adapter Part No. 830-00014 and probe Part No. 630-0217 listed above.

Suslick Vessel
830-00007

3-10 ml Vessel
830-00011

10-50 ml Vessel
830-00012

40-250 ml Vessel
830-00013

Adapter
830-00014